CONCERNING POULTRY

FEATHERS

By: Greg Davies

All background feather photos are by Aviculture Europe.

As anyone who has ever stepped into the poultry pavilion at any country show or fair will tell you, not all chickens look the same.

And the most noticeable differences lie in the plumage... that is, the feathers. Not just in the different colours and patterns either. There are other, more structural differences. Now you might think that a feather is a feather is a feather, but when it comes to chickens this just isn't so! So let's look at what makes up feathers and how different genetic factors can alter the basics to give us all the wonderfully different chickens we have today.

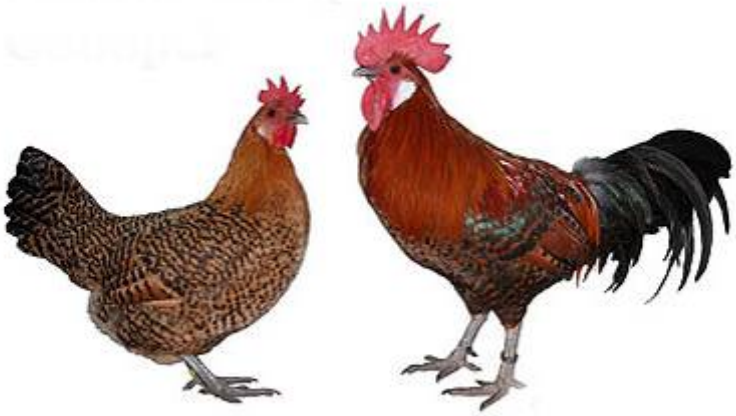
Feathers are made of a tough protein known as keratin. In addition to feathers, keratin also makes up the bird's beak and toenails (and hair, fur and nails in mammals, including humans). As light as the feathers may be, collectively they are still much heavier than the bird's skeleton which comprises many hollow bones.

Over the life of the bird, the feathers are replenished a couple of times each year through a process called moulting, where the old feathers drop out and are replaced by new ones which grow out of the same follicles. These new feathers are known as pin-feathers (and sometimes blood-feathers). The new feather starts out as basically an open blood vessel, supplying rich blood to the follicle. As it grows out, the sheath flakes away and the feather matures in length and shape. The blood vessel inside the shaft recedes and the growth of the feather is complete.

Right: A moulting hen with pin-feathers.
Photo: Monique de Vrijer.

So what do feathers actually do? They provide the bird with protection from the elements, weather-proofing and a means to control body temperature. They allow the bird to fly, therefore offering protection from predators and other danger and in some species, also afford camouflage. In chickens, which are dimorphic (the colours and feathers of the sexes are much different) they provide the means to attract the opposite sex. Feathers also give birds their final shape—let's face it—a plucked chicken looks a whole lot different in shape than a feathered one.

Below: The colours and feathers of the sexes are much different. Photo: Ad Taks.



Studies have indicated each grown chicken carries in excess of 5000 feathers, with some reports putting the number at closer to 7000, although hard-feathered breeds such as Malay Games which have large bare patches on their bodies, obviously carry less feathers than say, a soft-feathered bird like a Cochin which carries profuse feathering. Of these thousands of individual feathers, different types grow on various parts of the body and have a wide range of functions.

Feathers which cover and help mould the shape of the bird are called *contour feathers*. These do not grow uniformly over the bird; rather they grow from specific areas of skin known as pterylae, while other areas of skin called apterylae, remain bare. Some of these may also have a small secondary feather growing from the base of the quill called an after-shaft.

Above: A feather with an after-shaft.
Right: A semiplume. Photos: AE.

Semiplumes are half-way between a contour feather and a down feather. These occur between the contour feathers and help to supply insulation and a certain amount of form as well.

The feathers which are softest and closest to the skin are called *down feathers* or *plumules* and give insulation and shape to the bird.

Left: A down feather. Photo: AE.

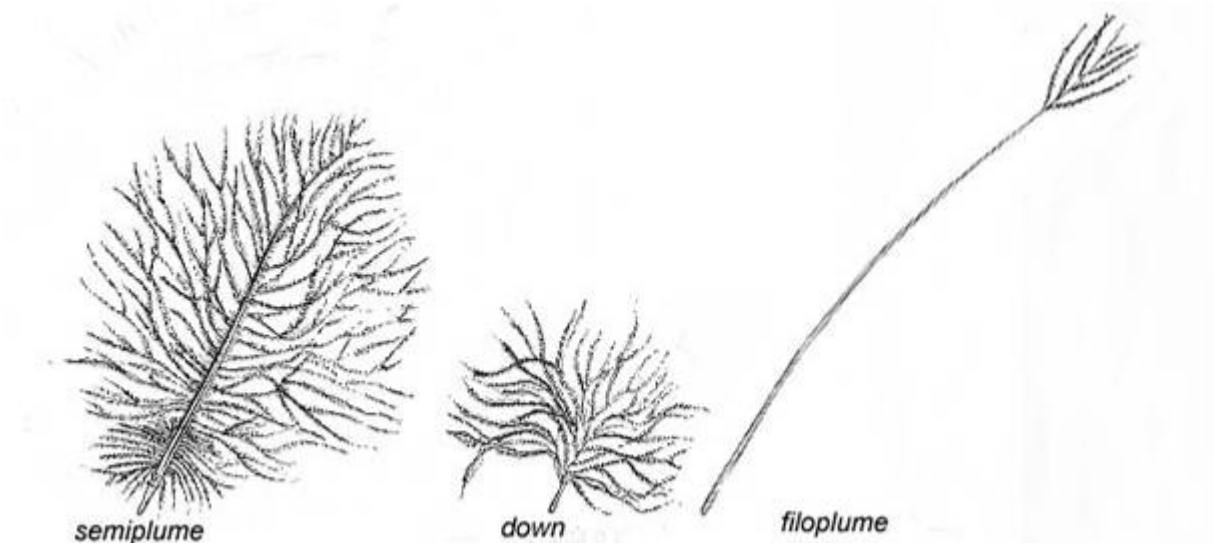
The main tail quill feathers (*retrices*) and wing quills (*remiges*) provide the ability to fly.

Right: The flight feathers of the wing and the flight feathers of the tail are the most important feathers for flight. As you can see the wing flight feather is asymmetrical i.e. the vane is much smaller on one side than the other.
Photo: Dirk de Jong.

There is one further type, known as filoplumes, which are hair-like and lie close to the skin. It is not known for sure what these do, however they may have some sensory functions.

Filoplumes are generally smaller than semiplumes and are on half to three fourths of the length of the covering contour feathers

Left: According to Somes (1978a) Dr. W.H.Mc.Gibbon was working with a feather trait that he called long filoplumes (Lf). This filoplumes occurred in the fluff areas of the body and were 1 to 10 cm longer than the adjacent feathers. No inheritance studies on this trait were published. McGibson claimed that this trait was inherited as autosomal dominant. Photo: Tuinvee, Sigrid van Dort.
Below: Drawing of various feathers. Courtesy www.summagallicana.com



Some birds such as pigeons have what are known as powder feathers. These continuously grow with the barbs at the tip breaking down into a dust-like powder, which keeps the plumage clean. This powder can cause lung irritation in humans.

The parts of a normal feather

Most feathers consist of the following parts. The **quill** is the hard stem which actually joins the feather to the bird's skin. This extends into the **rachis** (or shaft). Extending out from the shaft close to the base is the **fluff**. Further along the shaft comes the **web** which is the main surface of the feather. The edge of the web is called the **vane**. The web consists of branch-like barbs which in turn are lined with **barbules** and **troughs**. These interlock preventing air from passing through, while still allowing the feather to remain flexible. It works in a similar fashion to the fly zipper of your favourite jeans! The barbules and troughs are easily separated creating breaks in the feather vane, the bird repairs these breaks by running its beak along the separation and rejoining them just like a zipper. This is partly what chickens do when they preen themselves.

Left:
A Guinea feather.
Photo: Wikipedia.

However, not all breeds of chickens have these conventional feathers.

Silkies have a unique feather structure which gives them a fluffy "hairy" appearance. Normal feather structure is caused by the *'H'* gene, however Silkies carry a recessive *'h'* gene which is not present in other breeds of fowls. This results in the barbules being elongated and lacking the conformation required to hook together. It is this *'h'* gene which gives the Silkie its strange woolly appearance.

Left: Bearded Silky.
Photo: Hans Ringnalda.

Another breed with distinctively different plumage is the **Frizzle**. These birds have recurved feather shafts which makes the birds appear as if they have been put backwards through a wind tunnel! The feathers all curve toward the head. It is caused by an incompletely dominant gene *'F'* and dependant on the influences of one of three recessive modifying genes. This means there are three distinct types of frizzling. The first of these gives extreme curling with narrow, weak feathers and a woolly appearance. The second gives less extreme curling, longer feathers of stronger structure (these are the exhibition type Frizzles). The last group displays no frizzling at all yet these are valuable as breeding stock, useful for improving feather length and quality.

Left and above: Exhibition type Frizzles; white Chabo cockerel and pullet.
Photo: Elio Corti.

Below: Homozygous for *F* - without intervention of *mf* - the very curved spine of the feather also gives extremely curled beards, and the webbing is fragile, so it breaks easily, leaving these chickens almost naked. To maintain a constant body temperature these chickens have to produce more heat, resulting in a heart to overwork, which therefore becomes exaggerated. These males reach sexual maturity more slowly and the females start laying later and lay less eggs.
Photos: Courtesy Elio Corti. www.summagallicana.com

When the hen got broody she was given some eggs which she successfully hatched. She was a good mother inspite of the poor feathering.

Next we have the **Naked Necks**. These birds have large, well defined areas of skin where no feathers grow at all. The gene responsible for this bare-necked appearance is *'Na'*, an incompletely dominant gene which also can give sometimes up to 40% reduced plumage all over the bird. Some also have a goatee style growth of feathers on the throat and rarely, fully feathered birds occur. Naked Necks also have areas of bare skin under the wings, around the vent and along the tops of the thighs and sides of the body.

Above: From Romania, Naked Necks.
Photo: Bobo Athes.

Right: From France, a Cou Nu du Forez.
Photo: Dirk de Jong.

Finally, we have the **long-tailed fowls** of Japan. The Onagadori (Phoenix or Yokohama in the west) carries a gene which prevents the male birds moulting the tail feathers.

These can grow to incredible lengths of 30 feet or longer and are highly prized in their native Japan, though great care in raising such birds is needed as it takes some 10 years to attain such plumage. The females have normal length tails. For some reason, birds reared in the west never attain the spectacular length of feather as those found in Japan.

Right: A Yokohama cock.
Photo: Dirk de Jong.

Below: A Phoenix cock.
Photo: Mick Bassett.